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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,425	09/11/2003	Manabu Nohara	4105-24	4088

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NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER
LIU, LI

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/659,425	NOHARA ET AL.	
	Examiner	Art Unit	
	Li Liu	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/13/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on May 13, 2005 is being considered by the examiner.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 40 in Figure 14 (page 15, line 24).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 6 and 7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In claims 6 and 7, a "computer program **product**" is cited. However, the original disclosure does not provide enough description for one to know what the "**product**" is. Program codes or flow charts are not provided.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 6 and 7 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 6 and 7 claim a computer program per se. A computer program must be claimed encoded on a computer readable medium to be able to realize its function. Without the computer readable medium, the claims 6 and 7 are non-statutory.

Specification

7. The disclosure is objected to because of the following informalities: page 15, line 34, "FIG. 1" should be changed to "FIG. 2".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helkey et al (US 6,469,649) in view of Sakura et al(US 2001/0043093)

1). With regard to claims 1 and 4, Helkey et al discloses a modulating apparatus for optical communication which modulates a carrier by a modulation signal and generates a modulated wave, wherein modulation is executed to satisfy (column 6, line 10-26):

fd>f1, (the f_1 of Helkey et al is the fd of applicant, and the lower limit frequency f1 of a use-permitted frequency band can be a frequency between the "2" and "5" in Figure 8).

fu<f2 (the f_2 of Helkey et al is the fu of applicant, and the upper limit frequency of a use-permitted frequency band can be a frequency between the "7" and "10" in Figure 8), and

fd>fu/2 (Eq. 5, $f_1>f_2/2$, column 6, line 26, and column 27-39)

when a lower limit frequency of a use-permitted frequency band is f1 [Hz], an upper limit frequency of the use-permitted frequency band is f2 [Hz], a lower limit side band of the modulated wave is fd [Hz], and an upper limit side band of the modulated wave is fu [Hz].

But, Helkey et al discloses a modulated laser and does not discloses that the modulating apparatus generates a modulated wave to be supplied to a **light emitting diode**, or the light transmitting unit having the light emitting device which is driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave.

However, Sakura et al teaches a light transmitting unit, LEDs driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave, for optical communication because the LEDs can reduce the module cost ([0009]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the LEDs taught by Sakura et al with system and method of Helkey et al so that the system cost can be reduced and the nonlinear distortion can be removed.

2). With regard to claim 3, Helkey et al discloses all of the subject matter as applied in claim 1, and Helkey et al further discloses wherein the modulation is executed according to a modulating system including amplitude modulation (column 4 line 27-67).

3. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helkey et al (US 6,469,649) in view of in view of Sakura et al (US 2001/0043093) and McCarty (US 6,628,728).

Helkey et al discloses a modulating apparatus for optical communication which modulates a carrier by a modulation signal and generates a modulated wave, wherein modulation is executed to satisfy (column 6, line 10-26):

fd>f1, (the f_1 of Helkey et al is the fd of applicant, and the the lower limit frequency of a use-permitted frequency band can be any number between the "2" and "5" in Figure 8).

fu<f2, (the f_2 of Helkey et al is the fu of applicant, and the the upper limit frequency of a use-permitted frequency band can be any number between the "7" and "10" in Figure 8) and

fd>fu/2 (Eq. 5, $f_1>f_2/2$, column 6, line 26, and column 27-39),

Helkey discloses a center frequency $fc = (f_1+f_2)/2$, and then

$f_1 = fc - (f_1+f_2)/2$, and $f_2 = fc + (f_1+f_2)/2$,

by Eq. 5, $f_1>f_2/2$, it can be easily obtained that:

$fc = (f_1+f_2)/2 > 3*(f_2-f_1)/2$,

since the symbol rate fsr can be interpreted as (f_2-f_1), we have:

$fc > 3fsr/2$.

when a lower limit frequency of a use-permitted frequency band is f_1 [Hz], an upper limit frequency of the use-permitted frequency band is f_2 [Hz], a carrier frequency is fc [Hz], and a symbol rate of the modulation signal is fsr.

But, Helkey et al discloses a modulated laser and does not discloses that (A) the modulating apparatus generates a modulated wave to be supplied to a **light emitting diode** or a light transmitting unit having the light emitting device which is driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave; and (B) fc>3(1+ α)fsr/2, a rolloff factor is α.

With regard to item (A), however, Sakura et al teaches a light transmitting unit, LEDs driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave, for optical communication because the LEDs can reduce the module cost ([0009]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the LEDs taught by Sakura et al with system and method of Helkey et al so that the system cost can be reduced and the nonlinear distortion can be removed.

With regard to item (B), it can be seen that the condition fc > 3fsr/2 is the special case when the rolloff factor of a Nyquist filter is zero (α=0), the Nyquist filter has been widely used in digital or optical communications, such Nyquist filter has the advantage to eliminate the inter-symbol interference et at and minimize the noise effects, as disclosed by McCarty (BACKGROUND).

While the Nyquist filter is used, the parameter controlling the bandwidth of the raised cosine Nyquist filter is the roll-off factor α. The roll-off factor α is one (α =1) if the ideal low pass filter bandwidth is doubled, that is the stop band goes to zero at twice the bandwidth ($2f_N$) of an ideal brick wall filter at f_N. If α.=0.5 a total bandwidth of $1.5f_N$ would

result, and so on (Figure 3a, column 4 line 56-65, and column 5 the equations). The lower the value of the roll-off factor α, the more compact the spectrum becomes but the longer time it takes for the impulse response to decay to zero. FIGS. 3a and 3b illustrate three cases, namely when α=0, α=0.5 and α=1.0. Because of the rolloff factor α, the frequency band for a rolloff factor α can be written as $(1+\alpha)f_N$.

Then for a carrier frequency of fc and a symbol rate fsr (that is $2f_N$ in McCarty), it is inherent that: the upper limit sideband for a rolloff factor α will be: $fu = fc + (1+\alpha)f_{sr}/2$; and the lower limit sideband for a rolloff factor α will be: $fd = fc - (1+\alpha)f_{sr}/2$. Therefore, through the Eq. 5, $f_1>f_2/2$, disclosed by Helkey, it can be easily obtained that:

$fc > 3(1+\alpha)fsr/2$.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the Nyquist filter taught by McCarty to the system of Helkey et al so that the noise effect can be efficiently minimized and nonlinear distortion can be removed.

4. Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helkey et al (US 6,469,649) in view of in view of Sakura et al (US 2001/0043093) and Kleiner (US 6,847,997).

Helkey et al discloses a method for optical communication which modulates a carrier by a modulation signal and generates a modulated wave, wherein modulation is executed to satisfy (column 6, line 10-26):

fd>f1, (the f_1 of Helkey et al is the fd of applicant, and the lower limit frequency f1 of a use-permitted frequency band can be a frequency between the "2" and "5" in Figure 8).

fu<f2 (the f_2 of Helkey et al is the fu of applicant, and the upper limit frequency of a use-permitted frequency band can be a frequency between the "7" and "10" in Figure 8), and

fd>fu/2 (Eq. 5, $f_1>f_2/2$, column 6, line 26, and column 27-39)

when a lower limit frequency of a use-permitted frequency band is f1 [Hz], an upper limit frequency of the use-permitted frequency band is f2 [Hz], a lower limit side band of the modulated wave is fd [Hz], and an upper limit side band of the modulated wave is fu [Hz].

But, Helkey et al discloses a modulated laser and does not discloses that (A) the modulating apparatus generates a modulated wave to be supplied to a light emitting device which is driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave; (B) a **computer program product** for making a computer function as a modulating apparatus, by executing the computer program, for optical communication which modulates a carrier by a modulation signal and generates a modulated wave to be supplied to a light emitting device.

With regard to item (A), however, Sakura et al teaches a light transmitting unit, LEDs driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave, for optical communication because the LEDs can reduce the module cost ([0009]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the LEDs taught by Sakura et al with system and method of Helkey et al so that the system cost can be reduced and the nonlinear distortion can be removed.

With regard to item (B), it is well known that the computer or computer programs can be used to control the transmitter parameters so to get the best transmission quality, one example of the computer programs is disclosed by Kleiner. Kleiner uses computer program to control communication links and monitor the link quality (Figure 4 and 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the frequency condition in the computer program similar to that taught by Kleiner to the system and method of Helkey et al and Sakura et al so that the transmitter carrier frequency and symbol rate can be dynamically determined and the nonlinear distortion can be removed easily.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helkey et al (US 6,469,649) in view of in view of Sakura et al (US 2001/0043093) and McCarty (US 6,628,728) and Kleiner (US 6,847,997).

Helkey et al discloses a modulating apparatus for optical communication which modulates a carrier by a modulation signal and generates a modulated wave, wherein modulation is executed to satisfy (column 6, line 10-26):

fd>f1, (the f_1 of Helkey et al is the fd of applicant, and the the lower limit frequency of a use-permitted frequency band can be any number between the "2" and "5" in Figure 8).

fu<f2, (the f_2 of Helkey et al is the fu of applicant, and the the upper limit frequency of a use-permitted frequency band can be any number between the "7" and "10" in Figure 8) and

fd>fu/2 (Eq. 5, $f_1>f_2/2$, column 6, line 26, and column 27-39,

Helkey discloses a center frequency $fc = (f_1+f_2)/2$, and then

$f_1 = fc - (f_1+f_2)/2$, and $f_2 = fc + (f_1+f_2)/2$,

by Eq. 5, $f_1>f_2/2$, it can be easily obtained that:

$fc = (f_1+f_2)/2 > 3*(f_2-f_1)/2$,

since the symbol rate fsr can be interpreted as (f_2-f_1), we have:

$fc > 3fsr/2$.

when a lower limit frequency of a use-permitted frequency band is f_1 [Hz], an upper limit frequency of the use-permitted frequency band is f_2 [Hz], a carrier frequency is fc [Hz], and a symbol rate of the modulation signal is fsr.

But, Helkey et al discloses a modulated laser and does not discloses that (A) the modulating apparatus generates a modulated wave to be supplied to a **light emitting diode** or a light transmitting unit having the light emitting device which is driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave; (B) $fc>3(1+\alpha)fsr/2$, a rolloff factor is α; and (C) a **computer program product** for making a computer function as a modulating apparatus, by executing the computer

program, for optical communication which modulates a carrier by a modulation signal and generates a modulated wave to be supplied to a light emitting device.

With regard to item (A), however, Sakura et al teaches a light transmitting unit, LEDs driven by the modulated wave generated by the modulating apparatus and outputs a light-modulated wave, for optical communication because the LEDs can reduce the module cost ([0009]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the LEDs taught by Sakura et al with system and method of Helkey et al so that the system cost can be reduced and the nonlinear distortion can be removed.

With regard to item (B), it can be seen that the condition $fc > 3fsr/2$ is the special case when the rolloff factor of a Nyquist filter is zero ($\alpha=0$), the Nyquist filter has been widely used in digital or optical communications, such Nyquist filter has the advantage to eliminate the inter-symbol interference et at and minimize the noise effects, as disclosed by McCarty (BACKGROUND).

While the Nyquist filter is used, the parameter controlling the bandwidth of the raised cosine Nyquist filter is the roll-off factor α. The roll-off factor α is one ($\alpha =1$) if the ideal low pass filter bandwidth is doubled, that is the stop band goes to zero at twice the bandwidth ($2f_N$) of an ideal brick wall filter at f_N. If $\alpha=0.5$ a total bandwidth of $1.5f_N$ would result, and so on (Figure 3a, column 4 line 56-65, and column 5 the equations). The lower the value of the roll-off factor α, the more compact the spectrum becomes but the longer time it takes for the impulse response to decay to zero. FIGS. 3a and 3b illustrate

three cases, namely when α=0, α=0.5 and α=1.0. Because of the rolloff factor α, that is the frequency band for a rolloff factor α can be written as $(1+\alpha)f_N$.

Then for a carrier frequency of fc and a symbol rate fsr (that is $2f_N$ in McCarty), it is inherent that: the upper limit sideband for a rolloff factor α will be: $fu = fc + (1+\alpha)f_{sr}/2$; and the lower limit sideband for a rolloff factor α will be: $fd = fc - (1+\alpha)f_{sr}/2$. Therefore, through the Eq. 5, $f_1 > f_2/2$, disclosed by Helkey, it can be easily obtained that:

$fc > 3(1+\alpha)fsr/2$.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the Nyquist filter taught by McCarty to the system of Helkey et al so that the noise effect can be efficiently minimized and nonlinear distortion can be removed.

With regard to item (C), it is well known that the computer or computer programs can be used to control the transmitter parameters so to get the best transmission quality, one example of the computer programs is disclosed by Kleiner. Kleiner uses computer program to control communication links and monitor the link quality (Figure 4 and 5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the frequency condition in the computer program similar to that taught by Kleiner to the system and method of Helkey et al and Sakura et al so that the transmitter carrier frequency and symbol rate can be dynamically determined and the nonlinear distortion can be removed easily.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ackerman (US 6,246,500) discloses a method to minimize the second-order intermodulating distortion.

Aparin et al (US 6,166,599) discloses an impedance matching networks for non-linear circuits.

Dakin et al (US 4,499,502) discloses a conditional equation for carrier frequency and bandwidth.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER

Li Liu
October 3, 2006